

The Commission is seeking comments on a wide range of issues related to the concept of “cognitive” or “smart” radios. APCO’s primary concern is with those portions of the *NPRM* addressing two potential applications of cognitive radio

technology: interruptible spectrum leasing (§§51-67), and facilitating interoperability (§§74-76).

Interruptible Spectrum Leasing

As the *NPRM* suggests, interruptible spectrum leasing would potentially provide public safety licensees with the ability to lease access to their licensed spectrum when that spectrum is not in use, and then reclaim it at will, “interrupting” the lessee’s operations. In a separate proceeding (WT Docket No. 00-230), involving “secondary markets,” the Commission explored whether public safety agencies should be allowed to engage in such leasing. The *NPRM* in this proceeding assumes an affirmative answer to that question, and explores the technical viability of interruptible spectrum leasing through cognitive radio technology.

APCO filed comments in the secondary market proceeding raising serious legal and policy concerns regarding the concept of commercial leasing of public safety spectrum.¹ We noted that commercial spectrum leasing is prohibited by statute in the new 700 MHz public safety band, and that state and local laws may also bar commercial activities of this nature. We also expressed deep concern that spectrum leasing authority could distort and potentially corrupt spectrum management, worsening the already serious spectrum shortages that exist in many areas. In particular, the ability to lease spectrum could lead some state or local government entities to acquire more scarce channel capacity than needed for their internal operations, merely to provide an asset that

¹ Comments of the Association of Public-Safety Communications Officials-International, WT Docket 00-230, filed December 5, 2003.

can be leased for financial gain.² Finally, we questioned whether the limited market for interruptible spectrum would be sufficient to justify the R&D and equipment cost of cognitive radio technologies necessary to make such leasing viable.

The Commission's interest in interruptible spectrum leasing for public safety agencies is rooted in the assumption that public safety spectrum is "characterized by high peak-to-average use ratios and low average use." (§52). While that is true of many public safety systems, the Commission's assumption misses some key variables that impact the real (as opposed to theoretical) potential for interruptible spectrum leasing. The degree to which a public safety system has low average use will vary greatly depending upon the type of agencies using the system, whether it is trunked or conventional, and whether it is located in a rural or urbanized area.

In general, police radio systems (where users are constantly "on the street") and multi-agency systems tend to have higher average use than, for example, a system used primarily by a fire department that has more variable use patterns. Trunked systems, which allow for more intensive and efficient spectrum use by multiple users, will also have higher average use levels in most cases than conventional systems. Yet, trunked systems may be the only public safety systems for which interruptible spectrum leasing is technically viable, due to the need for centralized system control for "beacon" technology.

Most significantly, spectrum shortages in urban areas are such that public safety radio systems are much less likely than rural areas to have significant low use periods during which leasing would be viable. Urban systems tend to be overburdened with

² APCO noted that existing rules makes it difficult for the Commission or frequency coordinators to regulate the number of channels licensed to a particular entity.

insufficient capacity for their own needs, let alone “excess” capacity to lease. Yet, the presumed market for interruptible spectrum leasing will be greatest in those same urban areas, where *non*-interruptible commercial spectrum from existing sources is unavailable. This further suggests that much of what the Commission is pursuing in the *NPRM* and the companion secondary markets proceeding may turn out to be an academic exercise that consumes considerable time and resources, but which has little real impact on users.

Aside from these real-life practical issues, we remain skeptical of the technical viability of interruptible spectrum leasing. As noted in the comments of NPSTC, the “beacon technology” highlighted in the *NPRM* has significant limitations when applied to typical public safety system designs. This further suggests that there would be relatively few environments where interruptible spectrum leasing would be economically and technically viable. In any event, the technology necessary for such leasing will need to be fully tested in real-world non-public safety environments first, before its application to public safety systems where the risk of failure would have dire consequences for the safety of life and property.

Facilitating Interoperability

Cognitive radio, especially in the form of Software Defined Radio (SDR), could someday link radios across radio frequency bands, and thus promote interoperability among public safety personnel in the field. However, SDR technology also poses potential dangers insofar as it could cause disruptive interference to existing radio operations if not subject to standards and enforceable requirements. As discussed in the comments of NPSTC, SDR could also create new vulnerabilities for essential public

safety and homeland security communications. Thus, APCO continues to urge that the Commission exercise extreme caution on the issue of SDR. In particular, the technology should be tested in non-public safety frequency bands first to ensure that it works reliably without creating dangerous interference. That being said, we certainly encourage further work on SDR, recognizing its potential to provide long term solutions for interoperability.³

CONCLUSION

For the reasons set forth above and in the comments of NPSTC, the Commission should consider the full range of legal, spectrum management, practical, and technical concerns raised by cognitive radio technology.

Respectfully submitted,

ASSOCIATION OF PUBLIC-SAFETY
COMMUNICATIONS OFFICIALS-
INTERNATIONAL, INC.

By: /s/
Robert M. Gurss
Director, Legal & Government Affairs
APCO International
1725 DeSales Street, NW
Suite 808
Washington, DC 20036
(202) 833-3800

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³ The Comments of NPSTC address additional issues regarding SDRs.